

PCT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION
(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 26 April 2001 (26.04.01)	
International application No. PCT/GB00/02478	Applicant's or agent's file reference 5005/JEB/VSB
International filing date (day/month/year) 28 June 2000 (28.06.00)	Priority date (day/month/year) 28 June 1999 (28.06.99)
Applicant WRIGHT, Colin, Morgan	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

23 January 2001 (23.01.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer S. Mafla Telephone No.: (41-22) 338.83.38
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PA JT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

Date of mailing (day/month/year) 04 October 2001 (04.10.01)	From the INTERNATIONAL BUREAU
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To:

BARDO, Julian, Eason
Abel & Imray
20 Red Lion Street
London WC1R 4PQ
ROYAUME-UNI

Applicant's or agent's file reference 5005/JEB/VSB	IMPORTANT NOTIFICATION
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International application No. PCT/GB00/02478	International filing date (day/month/year) 28 June 2000 (28.06.00)
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1. The following indications appeared on record concerning:

the applicant the inventor the agent the common representative

Name and Address

WILLSHER & QUICK LTD.
Walrow Industrial Estate
Highbridge
Somerset TA9 4AQ
United Kingdom

State of Nationality

GB

State of Residence

GB

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person the name the address the nationality the residence

Name and Address

COOPER B-LINE LIMITED
Walrow Industrial Estate
Highbridge
Somerset TA9 4AQ
United Kingdom

State of Nationality

GB

State of Residence

GB

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

the receiving Office

the designated Offices concerned

the International Searching Authority

the elected Offices concerned

the International Preliminary Examining Authority

other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer
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Anman QIU

Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



A standard linear barcode is located at the bottom of the page, spanning most of the width.

**(43) International Publication Date
4 January 2001 (04.01.2001)**

PCT

**(10) International Publication Number
WO 01/01533 A1**

(51) International Patent Classification⁷: H02B 1/01

Morgan [GB/GB]; 42 Caernarvon Way, Burnham on Sea, Somerset TA8 2DO (GB).

(21) International Application Number: PCT/GB00/02478

(74) Agents: BARDO, Julian, Eason et al.; Abel & Imray, 20 Red Lion Street, London WC1R 4PQ (GB).

(25) Filing Language: English

(81) Designated States (*national*): GB, US

(26) Publication Language: English

(84) **Designated States (regional):** European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

(71) **Applicant** (*for all designated States except US*): WILL-SHER & QUICK LTD. [GB/GB]; Walrow Industrial Estate, Highbridge, Somerset TA9 4AO (GB).

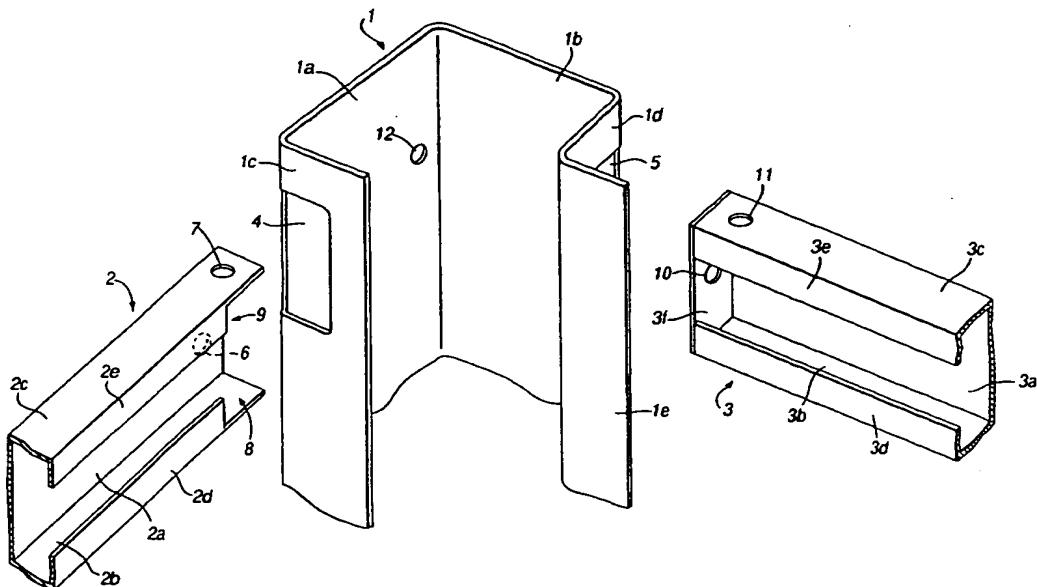
Published:

— *With international search report.*

(72) Inventor; and
(75) Inventor/Applicant (for US only): **WRIGHT, Colin,**

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FRAME STRUCTURE FOR AN ENCLOSURE FOR ELECTRICAL EQUIPMENT



WO 01/01533 A1

(57) **Abstract:** A frame structure for a rack for electrical equipment comprises a plurality of elongate members which are joined together at corners of the structure. The frame structure includes a corner joint at which two horizontal frame members (2, 3) and one vertical frame member (1) are joined together and the three frame members include portions which are juxtaposed to one another and are secured together by a common fastener (13) engaging the juxtaposed portions. The frame members forming the frame structure are preferably formed by bending from sheet metal.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 5005/JEB/VSB	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/GB 00/02478	International filing date (<i>day/month/year</i>) 28/06/2000	(Earliest) Priority Date (<i>day/month/year</i>) 28/06/1999
Applicant WILLSHER & QUICK LTD. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. Certain claims were found unsearchable (See Box I).

3. Unity of Invention is lacking (see Box II).

4. With regard to the title,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the abstract,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

2

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 00/02478

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H02B1/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H02B F16B A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 713 651 A (OLSEN JAMES E ET AL) 3 February 1998 (1998-02-03) column 2, line 55 -column 3, line 34 ---	1-4, 17-19
X	US 3 305 255 A (GENERAL ELECTRIC COMPANY) 21 February 1967 (1967-02-21) claim 1 ---	1-4, 17-19
X	FR 2 432 638 A (SIMONIAN RICHARD) 29 February 1980 (1980-02-29)	1,17
A	page 1, line 34 -page 2, line 24 ---	6,20
A	FR 2 566 222 A (ALSTHOM ATLANTIQUE) 20 December 1985 (1985-12-20) abstract -----	1,17



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

3 October 2000

09/10/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Dailloux, C

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/02478

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 5713651 A	03-02-1998	AU BR CA WO	2050597 A 9707742 A 2247845 A 9731556 A	16-09-1997 04-01-2000 04-09-1997 04-09-1997
US 3305255 A	21-02-1967		NONE	
FR 2432638 A	29-02-1980		NONE	
FR 2566222 A	20-12-1985		NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 5005/JEB/VSB	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/ GB 00/ 02478	International filing date (<i>day/month/year</i>) 28/06/2000	Priority date (<i>day/month/year</i>) 28/06/1999	
International Patent Classification (IPC) or national classification and IPC H02B1/01			
Applicant WILLSHER & QUICK LTD. et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

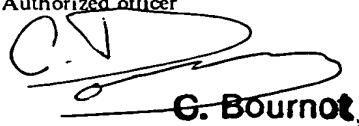
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 23/01/2001	Date of completion of this report 20.09.01
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer  G. Bournot



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

I. Basis of the report

1. This report has been drawn up on the basis of (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*)

the international application as originally filed

the description, pages 1-14 , as originally filed
pages , filed with the demand
pages , filed with the letter of

the claims, Nos. 1-25 , as originally filed
Nos. , as amended under Article 19
Nos. , filed with the demand
Nos. , filed with the letter of

the drawings, sheets / fig. 1/5 - 5/5 , as originally filed
sheets / fig. , filed with the demand
sheets / fig. , filed with the letter of

2. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.
- the drawings, sheets / fig.

3. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims	2-16, 18-21, 23, 24	YES
	Claims	1, 17, 22, 25	NO
Inventive Step	Claims		YES
	Claims	1 - 25	NO
Industrial Applicability	Claims	1 - 25	YES
	Claims		NO

2. Citations and Explanations

N,IS:

I. 1. Document US-A-5 713 651 discloses a frame structure (22) for a rack for electrical equipment, the frame structure (22) comprising a plurality of elongate members (24) which are joined together at corners of the structure, the frame structure including a corner joint (32) at which two horizontal frame members and one vertical frame member are joined together.

Furthermore, Figures 8 and 9 of this document show that the horizontal frame members and the vertical frame member include portions (83, 85) which are juxtaposed to one another and are secured together by a common fastener (80, 82) engaging the juxtaposed portions. (See also Figures 2, 3 and corresponding description).

Therefore, document US-A-5 713 651 discloses a frame structure comprising all the features of claim 1 so that the subject-matter of claim 1 is not new (Article 33(2) PCT).

2. Document US-A-5 713 651 (see Figures 6, 7) discloses also a frame structure comprising all the features of independent claim 17 so that the subject-matter of claim 17 is not new (Article 33(2) PCT).

In any case, document FR-A-2 432 638 discloses also a frame structure wherein a first one (7) of the frame members being of hollow section and a second one (1, 2) of the frame members passing through an opening (8, 9) in a wall of the first frame member (7) (see Figures 1-3 and corresponding description).

Thus, the subject-matter of claim 17 is not new (Article 33(2) PCT).

3. The subject-matter of independent claims 22 resp. 25 concerning a rack comprising a frame structure according to any preceding claim resp. a flat pack is also not new (Article 33(2) PCT).

II. Dependent claims 2-16; 18-21; 23, 24 contain either features which directly derive from the above considered documents, or feature which appear obvious to one skilled in the art.

Therefore, these dependent claims do not involve an inventive step (Article 33(3) PCT).

IA: The invention specified in the claims is clearly susceptible of industrial application in the sense of Article 33(4) PCT.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/GB00/02478

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents US-A-5 713 651 and FR-A-2 432 638 is not mentioned in the description, nor are these documents identified therein.

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 5005/JEB/VSB	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 00/02478	International filing date (day/month/year) 28/06/2000	Priority date (day/month/year) 28/06/1999
International Patent Classification (IPC) or national classification and IPC H02B1/01		
Applicant COOPER B-LINE LIMITED [WILLISHER & QUICK LTD. et al.]		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand

23/01/2001

Date of completion of this report

20.09.01

Name and mailing address of the IPEA/



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D-80298 Munich
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Fax: (+49-89) 2399-4465

Authorized officer

G. Bournot



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

PCT/GB00/02478

I. Basis of the report

1. This report has been drawn up on the basis of (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*)

 the international application as originally filed the description, pages 1-14 , as originally filed

pages , filed with the demand

pages , filed with the letter of

 the claims, Nos. 1-25 , as originally filed

Nos. , as amended under Article 19

Nos. , filed with the demand

Nos. , filed with the letter of

 the drawings, sheets / fig. 1/5 - 5/5 , as originally filed

sheets / fig. , filed with the demand

sheets / fig. , filed with the letter of

2. The amendments have resulted in the cancellation of:

 the description, pages: the claims, Nos. the drawings, sheets / fig.

3. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims	2-16, 18-21, 23, 24	YES
	Claims	1, 17, 22, 25	NO
Inventive Step	Claims		YES
	Claims	1 - 25	NO
Industrial Applicability	Claims	1 - 25	YES
	Claims		NO

2. Citations and Explanations

N,IS:

I. 1. Document US-A-5 713 651 discloses a frame structure (22) for a rack for electrical equipment, the frame structure (22) comprising a plurality of elongate members (24) which are joined together at corners of the structure, the frame structure including a corner joint (32) at which two horizontal frame members and one vertical frame member are joined together.

Furthermore, Figures 8 and 9 of this document show that the horizontal frame members and the vertical frame member include portions (83, 85) which are juxtaposed to one another and are secured together by a common fastener (80, 82) engaging the juxtaposed portions. (See also Figures 2, 3 and corresponding description).

Therefore, document US-A-5 713 651 discloses a frame structure comprising all the features of claim 1 so that the subject-matter of claim 1 is not new (Article 33(2) PCT).

2. Document US-A-5 713 651 (see Figures 6, 7) discloses also a frame structure comprising all the features of independent claim 17 so that the subject-matter of claim 17 is not new (Article 33(2) PCT).

In any case, document FR-A-2 432 638 discloses also a frame structure wherein a first one (7) of the frame members being of hollow section and a second one (1, 2) of the frame members passing through an opening (8, 9) in a wall of the first frame member (7) (see Figures 1-3 and corresponding description).

Thus, the subject-matter of claim 17 is not new (Article 33(2) PCT).

3. The subject-matter of independent claims 22 resp. 25 concerning a rack comprising a frame structure according to any preceding claim resp. a flat pack is also not new (Article 33(2) PCT).

II. Dependent claims 2-16; 18-21; 23, 24 contain either features which directly derive from the above considered documents, or feature which appear obvious to one skilled in the art.

Therefore, these dependent claims do not involve an inventive step (Article 33(3) PCT).

IA: The invention specified in the claims is clearly susceptible of industrial application in the sense of Article 33(4) PCT.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/GB00/02478

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents US-A-5 713 651 and FR-A-2 432 638 is not mentioned in the description, nor are these documents identified therein.

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
4 January 2001 (04.01.2001)

PCT

(10) International Publication Number
WO 01/01533 A1

(51) International Patent Classification⁷: **H02B 1/01** Morgan [GB/GB]; 42 Caernarvon Way, Burnham on Sea, Somerset TA8 2DQ (GB).

(21) International Application Number: **PCT/GB00/02478**

(22) International Filing Date: 28 June 2000 (28.06.2000) (74) Agents: **BARDO, Julian, Eason et al.**; Abel & Imray, 20 Red Lion Street, London WC1R 4PQ (GB).

(25) Filing Language: English (81) Designated States (*national*): GB, US.

(26) Publication Language: English (84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

(30) Priority Data:
9915040.1 28 June 1999 (28.06.1999) GB

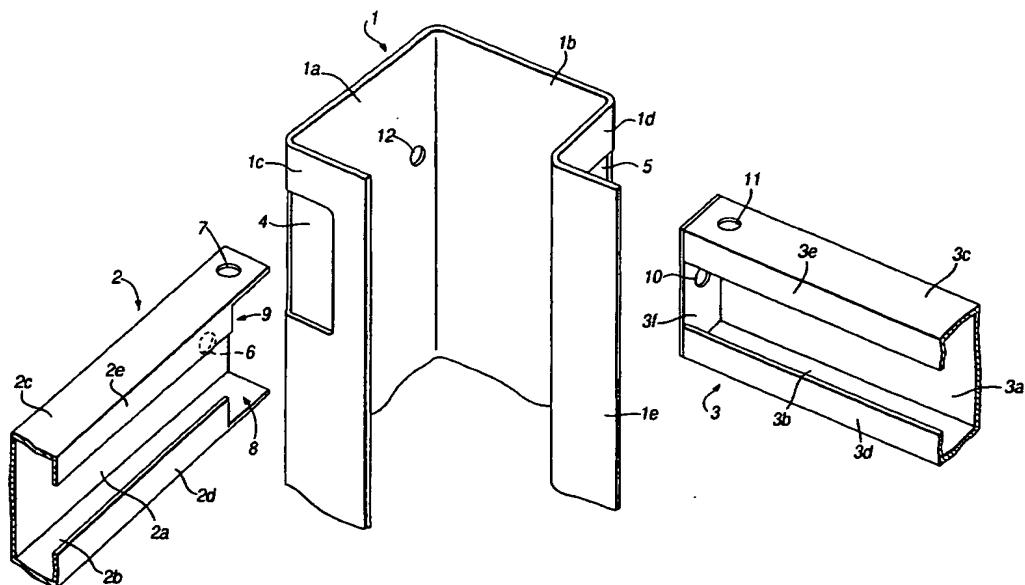
(71) Applicant (*for all designated States except US*): **WILLSHER & QUICK LTD.** [GB/GB]; Walrow Industrial Estate, Highbridge, Somerset TA9 4AQ (GB).

(72) Inventor; and
(75) Inventor/Applicant (*for US only*): **WRIGHT, Colin**,

Published:
— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FRAME STRUCTURE FOR AN ENCLOSURE FOR ELECTRICAL EQUIPMENT



(57) Abstract: A frame structure for a rack for electrical equipment comprises a plurality of elongate members which are joined together at corners of the structure. The frame structure includes a corner joint at which two horizontal frame members (2, 3) and one vertical frame member (1) are joined together and the three frame members include portions which are juxtaposed to one another and are secured together by a common fastener (13) engaging the juxtaposed portions. The frame members forming the frame structure are preferably formed by bending from sheet metal.

WO 01/01533 A1

Frame structure for an enclosure for electrical equipment

The invention relates to a frame structure for a rack for electrical equipment. The invention also relates to a 5 rack for electrical equipment, and to a flat pack from which such a rack can be formed. The rack will usually be clad with panels and thus take the form of what is referred to herein as an enclosure, but it may also be used without such panels.

10 It is well known to provide an enclosure that comprises a frame made up of various members with panels secured over the frame. At least some of the panels may be detachable to improve access to the frame. Commonly, the frame is a cuboidal frame and the frame members are 15 connected to one another at each of the corners of the frame. Thus, at each corner one vertical member and two horizontal members are connected together. To assemble the frame, it is then necessary merely to complete whatever assembly is required at each corner.

20 A wide variety of arrangements for corner connections of frame members are known. One common approach is to provide as a separate member a corner joint having three orthogonal projections each of which provides a fixing facility for a respective frame member. Providing such an 25 additional member can be very effective but leads to additional cost and complication.

It is an object of the invention to provide a frame structure which is effective but is inexpensive to manufacture and/or easy to assemble.

In a first aspect, the present invention provides a
5 frame structure for a rack for electrical equipment,
the frame structure comprising a plurality of elongate
members which are joined together at corners of the
structure, the frame structure including a corner joint at
which two horizontal frame members and one vertical frame
10 member are joined together, the horizontal frame members
and the vertical frame member including portions which are
juxtaposed to one another and are secured together by a
common fastener engaging the juxtaposed portions.

The frame structure can be made inexpensively and yet
15 be easy to assemble because no additional corner member
need be provided and a common fastener is used to join
together the three frame members that form the corner
joint, thereby offering a reduction in the total number of
fastening operations that are required.

20 It is an especially advantageous feature of the
invention that at least one, and preferably each, of the
three frame members that form the corner joint are formed
from sheet metal bent into the desired shape. In that way,
assembly can be simplified and construction costs can be
25 reduced.

Preferably a hole is provided in each of the three portions and the common fastener passes through the holes. The fastener may for example comprise male and female threaded parts. Instead of a hole a part of a member may 5 be omitted or cut-away to provide a gap or slot or some other opening and it is also possible, although not preferred, for two of the juxtaposed portions on opposite outer sides of the middle juxtaposed portion to have an appropriate fastening means engaging their inner faces in 10 some way and thereby securing the members together.

Preferably a first one of the frame members is of hollow section and a second one of the frame members passes through an opening in a wall of the first frame member. Forming a frame member as a member of hollow section is not 15 itself a novel proposal and frame members of a variety of hollow sections are known *per se*. By arranging for a second one of the frame members to pass through an opening in a wall of the first frame member, it becomes possible to maintain substantial strength for the first frame member 20 whilst facilitating the securing together of all three frame members by a common fastener. The opening may comprise a cut-away portion in the form of a slot but is preferably a substantially rectangular hole. The size of the rectangular hole is preferably such that the second 25 frame member fits freely, but preferably snugly, through the hole. In that case assembly remains straightforward

and indeed alignment of the members for fastening can be facilitated; furthermore extra resistance is provided against distortion of the corner joint after assembly.

Preferably a third one of the frame members passes through an opening in a further wall of the first frame member. Again the opening in the further wall is preferably defined by a substantially rectangular hole, and the third frame member is preferably a snug fit in the hole.

Preferably, the second frame member is of hollow section and the third frame member passes through an opening in a wall of the second frame member. In an embodiment of the invention described below, the opening in the wall of the second frame member is defined by cut-away portions of a pair of walls (flanges) of the second frame member; another possibility, however, would be to provide a rectangular hole. With arrangements of the kind just described it becomes a simple matter to arrange for portions of the three members to be juxtaposed to one another and secured together by a common fastener, but at the same time to provide a strong fixing. For example, this can easily be arranged by providing an end wall on the third frame member perpendicular to its longitudinal axis.

Various orientations of the corner joint are workable, but preferably the first frame member referred to above is the vertical frame member.

Where a frame member is formed from sheet metal bent into the desired shape, any opening in the frame member can be formed by punching out the metal that is not required, preferably before the metal is bent into the desired shape.

5 Also any required flanges can simply be formed as part of the frame member by appropriate bending. Furthermore a frame member need not have a closed section but may for example be formed with a longitudinal slot along all or part of one side of the frame member.

10 Whilst reference is made above to a common fastener engaging the juxtaposed portions of the frame members, it should be understood that further fasteners may be provided engaging the same juxtaposed portions of the frame members or other parts of two or all three frame members. Thus, at 15 least two of the frame members may include further portions which are juxtaposed to one another and extend in planes transverse to the planes of the first-mentioned juxtaposed portions, the further juxtaposed portions being secured together by a further common fastener engaging the further 20 juxtaposed portions. In both embodiments of the invention described below a further fastener engages further juxtaposed portions of the second and third frame members. In one of the embodiments of the invention described below a further fastener engages the juxtaposed portions of the 25 vertically extending frame member and the second frame member. In the case where the first frame member extends

vertically, the further fastener may also serve as a fastening location for a top panel of the enclosure (if the corner joint is at the top of the enclosure) or for a bracket supporting a castor or the like (if the corner 5 joint is at the bottom of the enclosure).

Preferably, the structure includes eight corner joints that are all substantially identical to each other, and the horizontally extending frame members are all substantially identical to each other. In that way assembly can be 10 simplified and manufacturing costs can be reduced. Furthermore the cross-sectional shape of the second and third members can conveniently be identical.

Preferably, the frame structure is substantially cuboidal.

15 In a second aspect, the present invention provides a frame structure for a rack for electrical equipment, the frame structure comprising a plurality of elongate members which are joined together at corners of the structure, the frame structure including a corner joint at which two horizontal frame members and one vertical frame member are 20 joined together, a first one of the frame members being of hollow section and a second one of the frame members passing through an opening in a wall of the first frame member.

25 The frame structure according to the second aspect of the invention may further comprise any of the features of

the frame structure according to the first aspect of the invention.

Where reference is made herein to an "enclosure", the term "enclosure" should not be taken to imply that there are continuous walls defining a fully closed space. In general it is desirable for there to be panels fitted to the frame structure in order both for the connections to be protected and for persons to be protected from the connections. It should be understood however, that it is within the scope of the present invention to provide an enclosure with only some panels or indeed a rack without any panels.

The present invention further provides a rack for electrical equipment comprising a frame structure according to the invention. Preferably the rack is an enclosure and includes one or more panels secured to the frame structure.

The present invention further provides a flat pack comprising a plurality of frame members for assembly on site into a rack for electrical equipment as defined above.

Preferably the rack or enclosure is suitable for having connections of cables in a telecommunications or data communications network.

By way of example, an embodiment of the invention will now be described with reference to the accompanying drawings, of which:

Fig. 1 is a perspective view of a portion of a skeleton frame structure for a rack for telecommunications or data communications equipment;

5 Fig. 2 is an exploded view of the portion of the structure shown in Fig. 1;

Fig. 3 is a perspective view of a portion of a skeleton frame structure for a rack for telecommunications or data communications equipment, similar in many respects to that
10 in Fig. 1

Fig. 4 is an exploded view of the portion of the structure shown in Fig. 3; and

Fig. 5 is a perspective view of an entire skeleton
15 frame structure.

Figs. 1 and 2 show a corner portion of a skeleton frame structure for a rack (which may be clad with panels to form an enclosure) suitable for housing connections of cables in a telecommunications or data communications network. The skeleton frame structure comprises four vertically extending frame members and eight horizontally extending frame members joined together at their ends to define a cuboid. The skeleton frame structure therefore includes eight corner joints each comprising one vertically extending frame member joined to two horizontally extending frame members. Figs. 1 and 2 illustrate one such corner

joint. The other seven corner joints are substantially the same as that shown in Figs. 1 and 2.

The joint comprises a vertically extending member 1, a first horizontally extending member 2, and a second 5 horizontally extending member 3. Only one end of each member is illustrated. It will be understood that one of the members 2, 3 will extend along a side of the frame structure and the other of the members 2, 3 will extend along the front or rear of the frame structure. In the 10 particular example described the member 3 is a side member and the member 2 a rear member. All three members 1, 2, 3 are formed from sheet metal pressed into a desired configuration. The three members may also be formed by extrusion, if desired.

15 The vertically extending member 1 is of generally square cross-section and comprises two adjacent, mutually perpendicular, outer walls 1a, 1b. The wall 1a is joined along one edge to the wall 1b and along an opposite edge to a wall 1c which extends inwardly from the wall 1a 20 perpendicular thereto. A portion of the wall 1c is cut away to form a rectangular hole 4. The wall 1b is joined along one edge to the wall 1a and along an opposite edge to a wall 1d which extends inwardly from the wall 1b perpendicular thereto and carries a flange 1e on its distal 25 edge, the flange 1e extending perpendicular to the wall 1d

and away from the wall 1a. A portion of the wall 1d is cut-away to form a rectangular hole 5.

The rear member 2 is of generally rectangular cross-section and comprises an outer wall 2a joined along each of 5 its opposite side edges to walls 2b, 2c which project inwardly perpendicular to the wall 2a. Each wall 2b, 2c is formed along its inner edge with an internal flange 2d, 2e respectively, those flanges being disposed in a common plane parallel to the wall 2a. The side member 3 is also 10 of a similar generally rectangular cross-section including walls 3a, 3b, 3c and flanges 3d, 3e. Flanges 2d and 2e are each cut-away at their ends to leave gaps 8, 9 respectively, and circular holes 6, 7 are provided in the walls 2a, 2c respectively towards the ends of the walls. 15 The side member 3 is formed with an end wall 3f perpendicular to the walls 3a, 3b, 3c and to the flanges 3d, 3e. A circular hole 10 is provided in the middle of the end wall 3f and a circular hole 11 is provided in the wall 3c towards the end of the wall. The corner joint is 20 assembled by passing the illustrated end of the rear member 2 through the rectangular opening 4 in wall 1c of the vertically extending member 1 until the member 2 abuts the outer wall 1b of the member 1; at that stage, the circular hole 6 in the outer wall 2a of the rear member 2 is aligned 25 with a circular hole 12 provided in the outer wall 1a of the vertically extending member 1. The side member 3 is

then passed through the opening 5 in wall 1d of the vertically extending member 1 and subsequently through the gaps 8, 9 in the flanges 2d, 2e of the rear member 2 until the end wall 3f of the side member 3 abuts the inner side 5 of the outer wall 2a of the rear member 2. At that stage, the hole 10 in the end wall 3f of the side member 3 is aligned with the hole 6 in the wall 2a of the rear member 2, and with the hole 12 in the outer wall 1a of the vertically extending member 1; also, the hole 11 in the 10 wall 3c of the side member 3 is aligned with the hole 7 in the wall 2c of the rear member 2. The three members 1, 2, 3 are then secured together by passing a fastener 13 through holes 12, 6, 10. A fastener 14 can also be passed through holes 7, 11; such a fastener may be provided to fix 15 a castor or other base member to the frame but may also have the effect of further strengthening the connection between the frame members.. If desired, for added strength, the three members 1, 2, 3 may each include a further hole (not shown) in their respective walls 1a, 2a and 3f, the 20 three further holes being positioned such that, once the skeleton frame structure has been assembled, the three further holes are aligned and a further fastener can be passed through the holes. Conveniently the fastener in each case comprises a screw threaded bolt that is passed 25 from the outside of the frame structure through the holes and engages a screw threaded female member fixed on the

inner face of the innermost juxtaposed wall (the wall 3f for the fastener 13 and the wall 3c for the fastener 14).

Figs. 3 and 4 show a corner portion of a skeleton frame structure for a rack, similar in many respects to 5 that shown in Figs. 1 and 2. The same reference numerals are used to designate corresponding parts.

The following description of the particular example shown in Figs. 3 and 4 relates mainly to those aspects which differ from the example shown in Figs. 1 and 2.

10 In the outer wall 2a, of the rear member 2, there is provided, in addition to the circular hole 6, a second circular hole 15. In the outer wall 1a, of the vertically extending member 1, there is provided, in addition to the circular hole 12, a circular hole 16. The corner joint is 15 assembled by passing the illustrated end of the rear member 2 through the rectangular opening 4 in wall 1c of the vertically extending member 1 until the member 2 abuts the outer wall 1b of the member 1; at that stage, the holes 6 and 15 in the outer wall 2a of the rear member 2 are 20 aligned with the holes 12 and 16 respectively, provided in the outer wall 1a of the vertically extending member 1. The side member 3 is then passed through the opening 5 in wall 1d of the vertically extending member 1 and subsequently through the gaps 8, 9 in the flanges 2d, 2e of the rear 25 member 2 until the end wall 3f of the side member 3 abuts the inner side of the outer wall 2a of the rear member 2.

At that stage, the hole 10 in the end wall 3f of the side member 3 is aligned with the hole 6 in the wall 2a of the rear member 2, and with the hole 12 in the outer wall 1a of the vertically extending member 1; also, the hole 11 in 5 the wall 3c of the side member 3 is aligned with the hole 7 in the wall 2c of the rear member 2. The three members 1, 2, 3 are then secured together by passing a fastener 13 through holes 12, 6, 10 (and, as in the earlier embodiment, a fastener 14 through holes 7, 11). The members 1 and 2 are 10 then further secured together by passing a fastener 17 through holes 16, 15. Like the fasteners 13, 14, conveniently the fastener 17 comprises a screw threaded bolt that is passed from the outside of the frame structure through the holes and engages a screw headed female member 15 fixed on the inner face of the inner most juxtaposed wall, that being the wall 2a.

The members 2 and 3 fit freely but snugly through the rectangular holes 4 and 5 in the member 1. The snug fit both facilitates assembly of the corner joint and resists 20 any significant movement of one frame member relative to another.

Fig. 5 shows a complete frame structure incorporating eight corner joints, each of which is substantially as described above. It will be appreciated that there are 25 various options for the orientations of the various corner joints. In Fig. 5, the form of each end of each of the

members 1, 2, 3 is the same, but another possibility for example would be to provide the member 2, one end of which is shown in Figs. 2 and 4, with its other end in the form of the end of member 3 that is shown in Figs. 2 and 4. In 5 that case the other end of member 3 would be in the form of the end of member 2 that is shown in Figs. 2 and 4.

In Fig. 5, it may be seen that the side members 3 are provided on their flanges 3e with a row of holes to which for example mounting angles of a standard kind known per se 10 may be fixed. Equipment such as cable connecting equipment and/or other electrical equipment can then be fixed to the mounting angles in the conventional way. Panels can also be attached to the frame structure by suitable means.

Claims

1. A frame structure for a rack for electrical equipment,
5 the frame structure comprising a plurality of elongate
members which are joined together at corners of the
structure, the frame structure including a corner joint at
which two horizontal frame members and one vertical frame
member are joined together, the horizontal frame members
10 and the vertical frame member including portions which are
juxtaposed to one another and are secured together by a
common fastener engaging the juxtaposed portions.
2. A frame structure according to claim 1, wherein at
least one of the frame members is formed by bending from
15 sheet metal.
3. A frame structure according to claim 1 or 2, wherein
each of the frame members is formed by bending from sheet
metal.
4. A frame structure according to any preceding claim, in
20 which a hole is provided in each of the three portions and
the common fastener passes through the holes.
5. A frame structure according to any preceding claim,
further including a second fastener which engages and
secures together two of the three frame members.
- 25 6. A frame structure according to any preceding claim, in
which a first one of the frame members is of hollow section

and a second one of the frame members passes through an opening in a wall of the first frame member.

7. A frame structure according to claim 6, in which the opening is defined by a substantially rectangular hole.

5 8. A frame structure according to claim 6 or 7, in which a third one of the frame members passes through an opening in a further wall of the first frame member.

9. A frame structure according to claim 8, in which the opening in the further wall is defined by a substantially 10 rectangular hole.

10. A frame structure according to claim 8 or 9, in which the second frame member is of hollow section and the third frame member passes through an opening in a wall of the second frame member.

15 11. A frame structure according to claim 10, in which the opening in the wall of the second frame member is defined by cut-away portions of one or more walls of the second frame member.

12. A frame structure according to any one of claims 6 to 20, in which the first frame member is the vertical frame member.

13. A frame structure according to any preceding claim, in which at least two of the frame members include further portions which are juxtaposed to one another and extend in 25 planes transverse to the planes of the first-mentioned juxtaposed portions, the further juxtaposed portions being

secured together by a further common fastener engaging the further juxtaposed portions.

14. A frame structure according to claim 13, in which the further juxtaposed portions extend substantially
5 horizontally.

15. A frame structure according to any preceding claim, wherein the structure includes eight corner joints that are all substantially identical to each other.

16. A frame structure according to any preceding claim,
10 wherein the frame structure is substantially cuboidal.

17. A frame structure for a rack for electrical equipment, the frame structure comprising a plurality of elongate members which are joined together at corners of the structure, the frame structure including a corner joint at
15 which two horizontal frame members and one vertical frame member are joined together, a first one of the frame members being of hollow section and a second one of the frame members passing through an opening in a wall of the first frame member.

20 18. A frame structure according to claim 17, wherein at least one of the frame members is formed from sheet metal bent into the desired shape.

19. A frame structure according to claim 17 or 18, wherein each of the frame members is formed by bending from sheet
25 metal.

20. A frame structure according to claim 17, 18 or 19, in which a third one of the frame members passes through an opening in a further wall of the first frame member.
21. A frame structure according to claim 20, in which the 5 second frame member is of hollow section and the third frame member passes through an opening in a wall of the second frame member.
22. A rack for electrical equipment comprising a frame structure according to any preceding claim.
- 10 23. A rack according to claim 22, in which the rack is an enclosure and includes one or more panels secured to the frame structure
24. A rack according to claim 23, in which said at least one panel is releasable.
- 15 25. A flat pack comprising a plurality of frame members for assembling on site into a rack according to any of claims 22 to 24.

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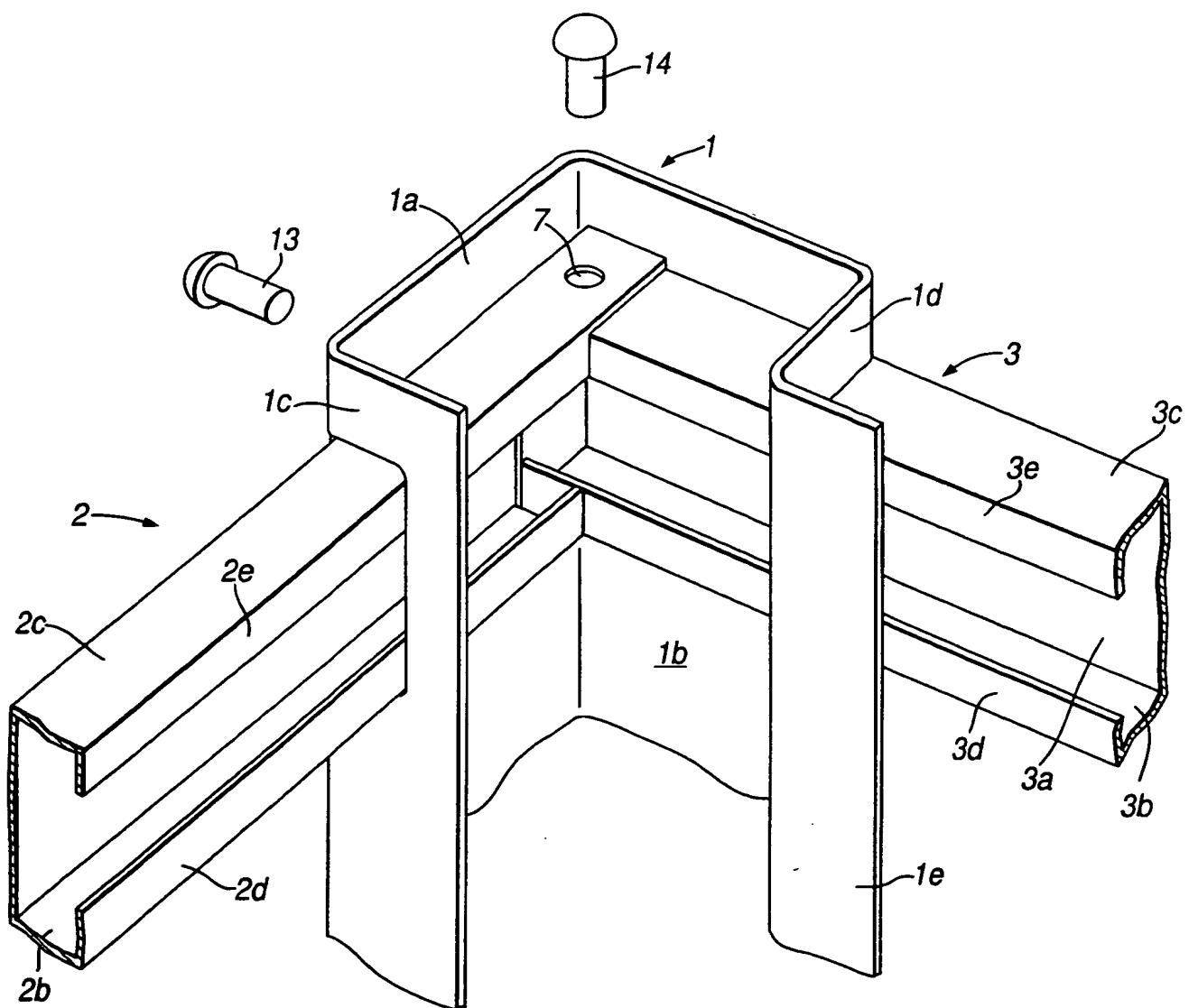
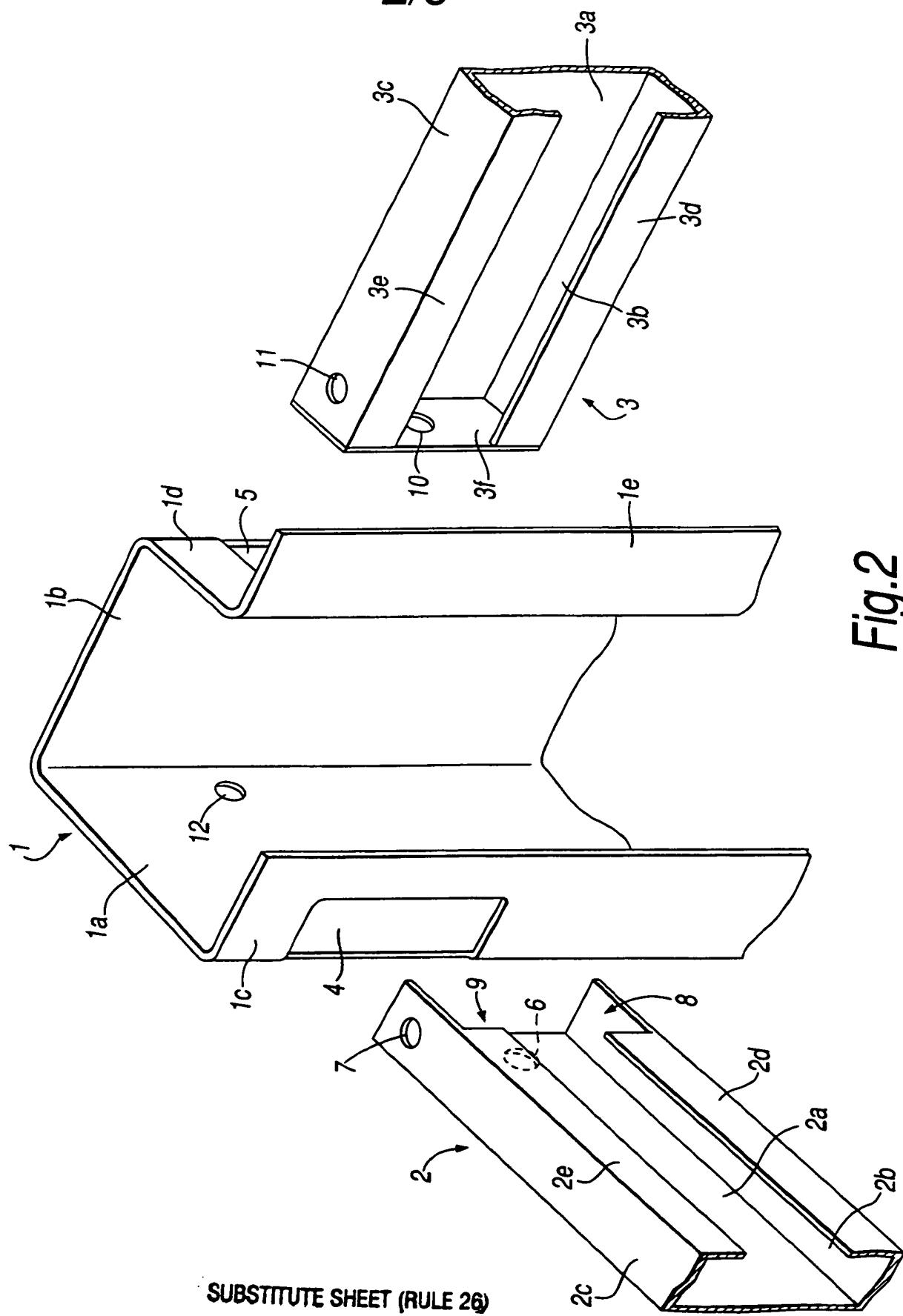


Fig. 1

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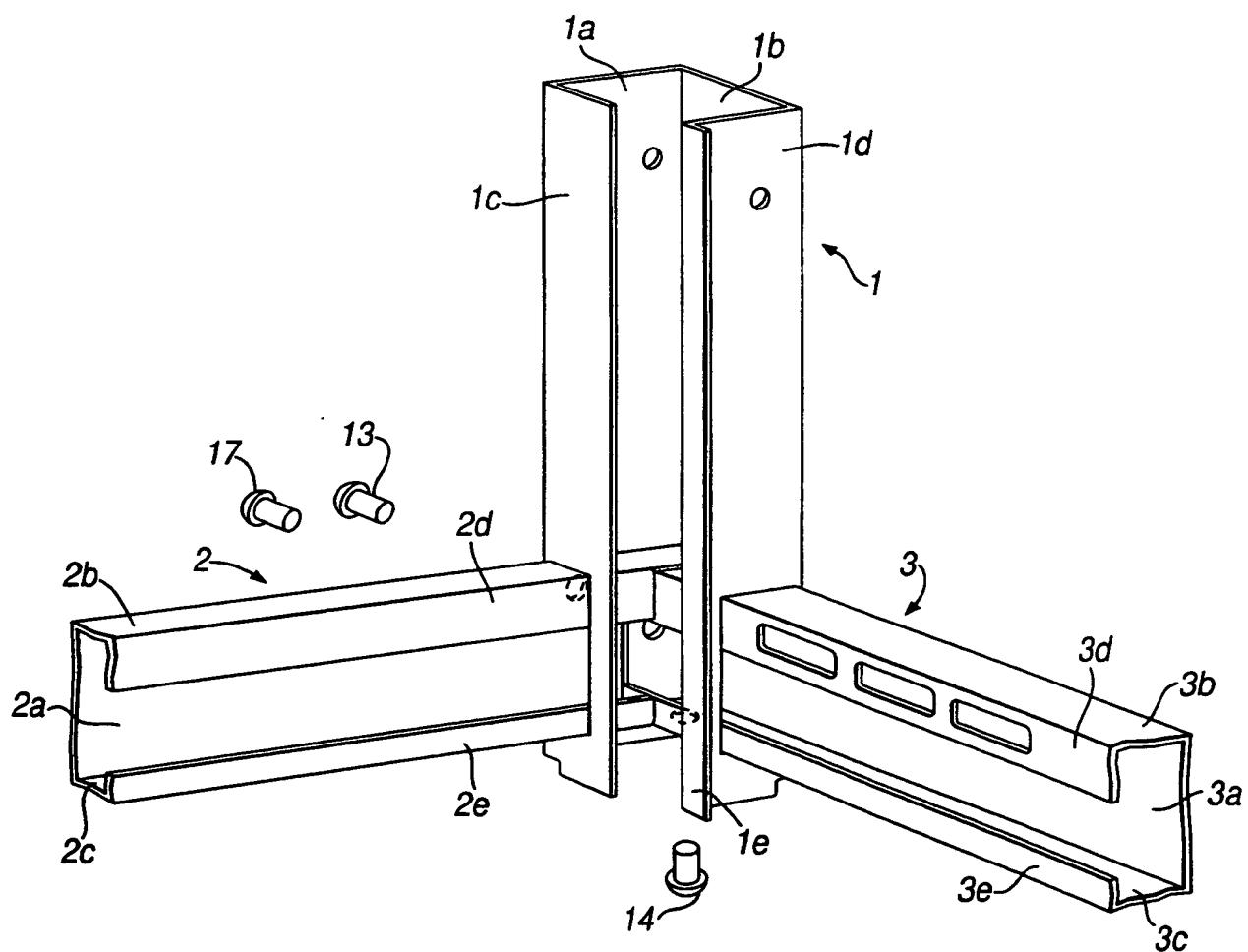


Fig.3

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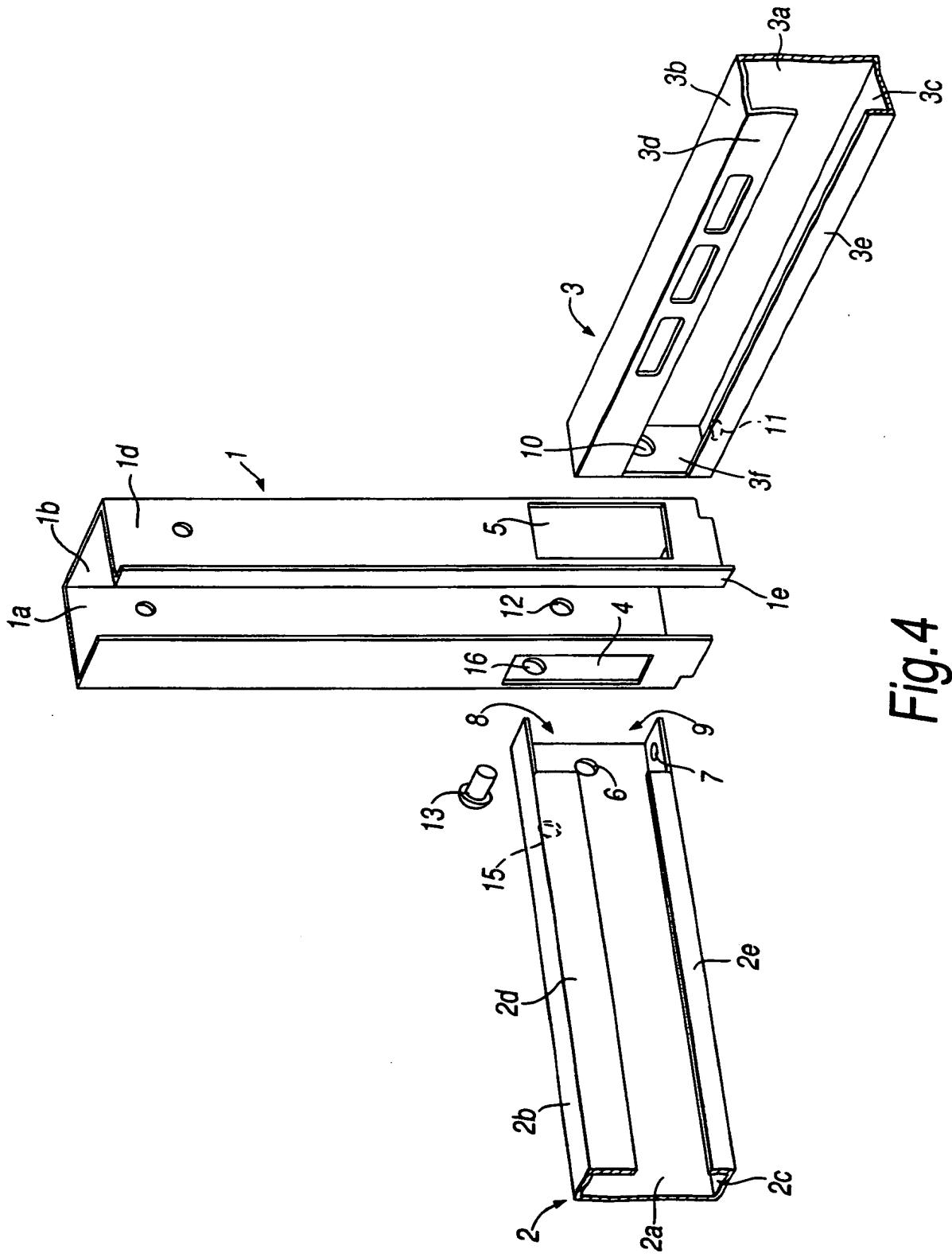


Fig. 4

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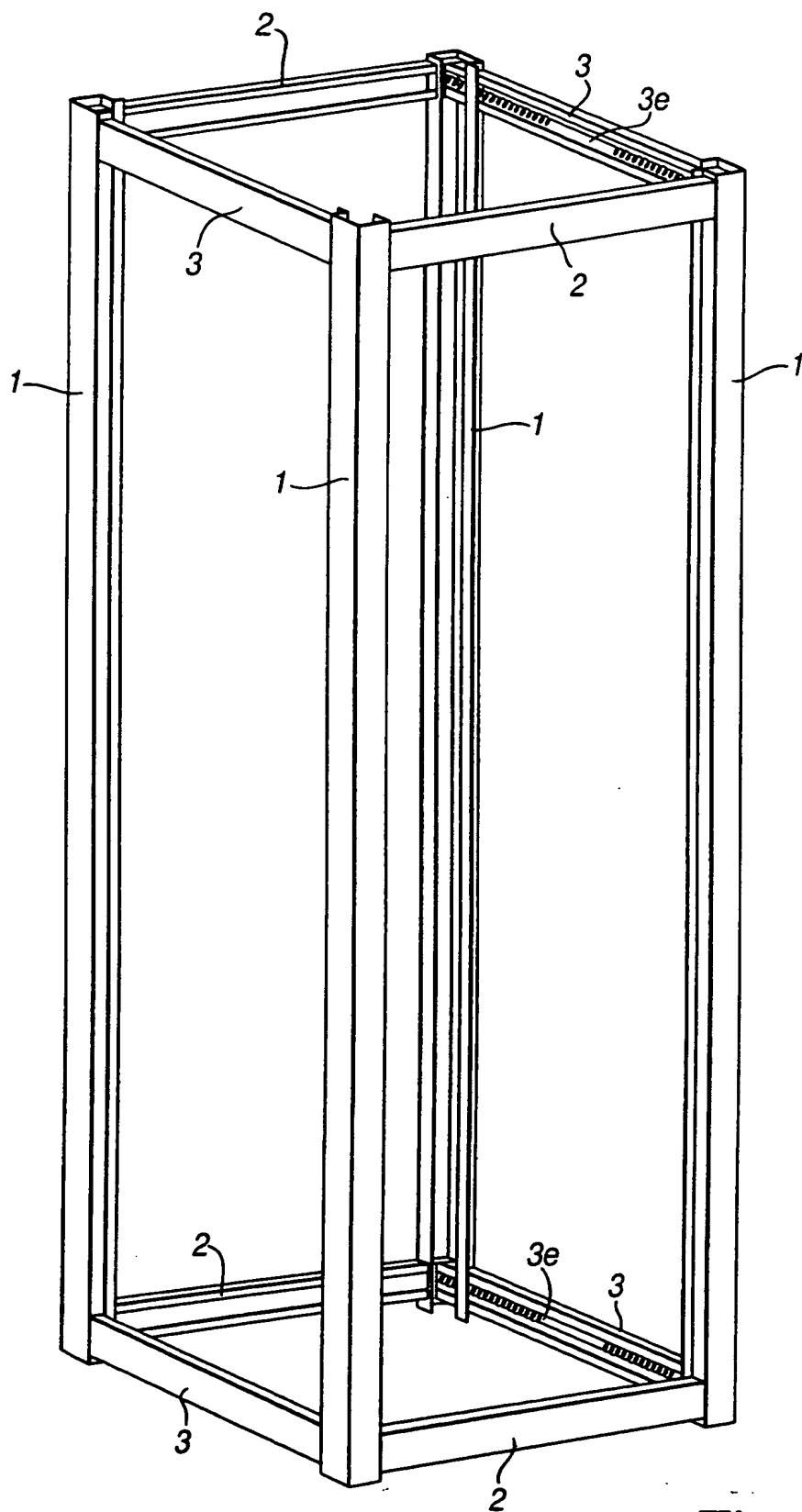


Fig.5

SUBSTITUTE SHEET (RULE 26)

INTERNATIONAL SEARCH REPORT

Internatinal Application No
PCT/GB 00/02478

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H02B1/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H02B F16B A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 713 651 A (OLSEN JAMES E ET AL) 3 February 1998 (1998-02-03) column 2, line 55 -column 3, line 34 ----	1-4, 17-19
X	US 3 305 255 A (GENERAL ELECTRIC COMPANY) 21 February 1967 (1967-02-21) claim 1 ----	1-4, 17-19
X	FR 2 432 638 A (SIMONIAN RICHARD) 29 February 1980 (1980-02-29) page 1, line 34 -page 2, line 24 ----	1,17
A	FR 2 566 222 A (ALSTHOM ATLANTIQUE) 20 December 1985 (1985-12-20) abstract -----	6,20
A	FR 2 566 222 A (ALSTHOM ATLANTIQUE) 20 December 1985 (1985-12-20) abstract -----	1,17

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

Date of mailing of the international search report

3 October 2000

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/GB 00/02478

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US 3305255	A 21-02-1967		NONE		
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